भारतीय मानक
Indian Standard

IS 101 (Part 2/Sec 1) : 2018

रोंगनों, वार्निशों और संबध उत्पादों के नमूने लेने और परीक्षण की पद्धतियाँ

भाग 2 तरल पेंट पर टेस्ट (रासायनिक परीक्षण)

अनुभाग 1 पानी की मात्रा

(चौथा पुनरीक्षण)

Methods of Sampling and Test for Paints, Varnishes and Related Products

Part 2 Test on Liquid Paints (Chemical Examination)

Section 1 Water Content

(Fourth Revision)

ICS 87.040

© BIS 2018

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली–110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.org.in www.standardsbis.in

August 2018 **Price Group 1**

Paints, Varnishes and Related Products Sectional Committee, CHD 20

FOREWORD

This Indian Standard (Part 2/Sec 1) was adopted by the Bureau of Indian Standards, after the draft finalized by the Paints, Varnishes and Related Products Sectional Committee had been approved by the Chemical Division Council.

This standard (Part 2/Sec 1), is part of IS 101 series of Indian Standards, which deals with methods of sampling and tests for paints, varnishes and related products. In the third revision of this standard in 1988, this standard replaced **14** of IS 101 : 1964 ‘Methods of test for ready mixed paints and enamels (*second revision*)’.

The Committee observed that the Dean and Stark method prescribed in third revision is suitable for determination of water content in paints if the percentage of water content is more than 0.5 percent. There is no method of test prescribed for water content less than 0.5 percent. Therefore, the Committee decided to incorporate Karl Fischer method (Direct Electrometric Titration) in this revision of the standard for determination of water content in paints if the percentage of water content is less than 0.5 percent. In this revision, reference to corresponding Indian Standards for Dean and Stark method and Karl Fischer method is also given. The Karl Fischer method (Direct Electrometric Titration) is equivalent to the corresponding method prescribed in ISO 760 : 1978 ‘Determination of water — Karl Fischer method (General method)’.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’.

Indian Standard

METHODS OF SAMPLING AND TEST FOR PAINTS, VARNISHES AND RELATED PRODUCTS

PART 2 TEST ON LIQUID PAINTS (CHEMICAL EXAMINATION)

Section 1 Water Content

(Fourth Revision)

1 SCOPE

1.1 This standard prescribes the Dean and Stark method and the Karl Fischer (Direct Electrometric Titration) method for determination of water content in paints.

1.1.1 The Karl Fischer (Direct Electrometric Titration) method is applicable if percentage of water content suspected to be present is less than 0.5 percent.

1.1.2 The Dean and Stark method is applicable if percentage of water content suspected to be present is more than 0.5 percent.

2 REFERENCES

The standards listed hereunder contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

IS No.	*Title*
229 : 1993	Ethyl acetate — Specification (*third revision*)
231 : 1957	Specification for amyl acetate
537 : 2011	Toluene — Specification (*second revision*)
1070 : 1992	Specification for reagent grade water (*third revision*)
1211 : 1978	Determination of water content (Dean and Stark method)
2362 : 1993	Determination of water content by Karl Fischer method — Test method (*second revision*)

3 TERMINOLOGY

For the purpose of this standard, the definition given below shall apply.

3.1 Water Content — The quantity of water present in a material, expressed as a percentage by mass of the material.

4 PRINCIPLE

4.1 Karl Fischer Method

Reaction of any water present in a test portion with a solution of Karl Fischer reagent, previously standardized by titration with an exactly known mass of water.

4.2 Dean and Stark Method

The material is refluxed with organic solvent which is immiscible with water. The carrier liquid distils into a graduated receiver carrying water with it which then separates to form the lower layer, the excess carrier liquid overflowing from the trap and returning to the still.

5 QUALITY OF REAGENTS

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

6 DEAN AND STARK METHOD

6.1 Apparatus — As prescribed in **3.1** to **3.5** of IS 1211.

All glasswares used, should be previously dried for at least 30 min in an electrically operated oven controlled at approximately 130°C and cooled and stored in a desiccator containing the desiccant (granulated aluminium sodium silicate, anhydrous). While using such glasswares for estimation of moisture content, care should be taken to protect them from absorbing moisture from the surrounding atmosphere.

6.2 Reagents — Carrier liquid.

6.2.1 *Dry Toluene* — Toluene, reagent grade (*see* IS 537).

6.2.2 *Ethyl Acetate or Amyl Acetate* — (*see* IS 229) or (*see* IS 231).

6.3 Procedure

6.3.1 Weigh 100 g of the material under test in the flask, add 100 ml of dry toluene and 1 ml of dry ethyl acetate or amyl acetate and thoroughly mix the contents of the flask. Pour toluene solvent into the receiver up to the level of the side tube and follow the procedure prescribed in **4.1** of IS 1211.

6.4 Results and Report

6.4.1 *Results*

Record the quantity of water in the receiver in ml and also the temperature at which the sample was measured. Assuming the density as 1.000 g/ml for the water collected in the receiver, calculate the percentage of water (by mass) in the material.

6.4.2 *Report*

Reporting of results shall be as prescribed in **5.1** of IS 1211.

6.5 Precision

As prescribed in **6.1** of IS 1211.

7 KARL FISCHER METHOD (DIRECT ELECTROMETRIC TITRATION)

7.1 Apparatus — As prescribed in **6** of IS 2362.

All glasswares used, should be previously dried for at least 30 min in an electrically operated oven controlled at approximately 130°C and cooled and stored in a desiccator containing the desiccant (granulated aluminium sodium silicate, anhydrous). While using such glasswares for estimation of moisture content, care should be taken to protect them from absorbing moisture from the surrounding atmosphere.

7.2 Reagents — Karl Fischer reagent as prescribed in **5.7** of IS 2362.

7.3 Procedure

7.3.1 Weigh 100 g of the material under test in the flask, add 100 ml of dry toluene and 1 ml of dry ethyl acetate or amyl acetate and thoroughly mix the contents of the flask and follow the procedure prescribed in **7** of IS 1211.

7.4 Results and Report

7.4.1 *Results*

Calculate the quantity of water as the percentage of water (by mass) in the material.

7.4.2 *Report*

Reporting of results shall be as water content to the nearest 0.01 percent by mass.

7.5 Precision

Duplicate determination shall not differ by more than 2 percent of the mean of the two results.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of ‘BIS Catalogue’ and ‘Standards : Monthly Additions’.

This Indian Standard has been developed from Doc No.: CHD 20 (2056).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.org.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, CHANDIGARH 160019	26 50206 265 0290
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	2832 9295, 2832 7858 2832 7891, 2832 7892

Branches: AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi